

**Report to/Rapport au:**

**Transportation Committee  
Comité des transports  
and Council / et au Conseil**

**31 March 2010 / le 31 mars 2010**

**Submitted by/Soumis par :**

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City Wide/à l'échelle de la Ville

Ref N° : ACS2010-COS-PWS-0001

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**SUBJECT: PEDESTRIAN SAFETY EVALUATION PROGRAM**

**OBJET : PROGRAMME D'ÉVALUATION DE LA SÉCURITÉ DES PIÉTONS**

### **REPORT RECOMMENDATIONS**

**That the Transportation Committee recommend Council approve:**

- 1. A three year pilot of the Pedestrian Safety Evaluation Program for intersections, as outlined in this report;**
- 2. That countermeasures identified by staff, the ward Councillors and the community, through the Pedestrian Safety Evaluation Program, be implemented in 2010 at Donald Street and the Vanier Parkway; and Carling Avenue and Holland Avenue; and,**
- 3. That staff prepare an evaluation report of the three year pilot for Transportation Committee in 2013.**

### **RECOMMANDATIONS DU RAPPORT**

**Que le Comité des transports recommande au Conseil d'approuver :**

- 1. la mise à l'essai pendant trois ans du programme d'évaluation de la sécurité des piétons aux intersections, tel qu'il est présenté dans le présent rapport;**
- 2. l'application, en 2010, des mesures préventives élaborées par le personnel de la Ville, les conseillers de quartier et la communauté dans le cadre du programme d'évaluation de la sécurité des piétons aux intersections de la rue Donald et de la promenade Vanier ainsi que des avenues Carling et Holland;**
- 3. la remise au Comité des transports, en 2013, d'un rapport d'évaluation du projet pilote de trois ans préparé par le personnel de la Ville.**

**EXECUTIVE SUMMARY**

On February 5, 2003, the Transportation and Transit Committee approved the following motion, which was subsequently approved by City Council on February 26, 2003:

*"That Council direct staff to continue to pursue the development of methods that can be used to assess pedestrian safety at intersections, using both the information developed by the Walking Security Index, other analytical techniques, and report to Committee and Council."*

**Assumptions and Analysis:**

The objective of this project on pedestrian safety is to develop a customized process that combines traffic engineering with public engagement, for prioritizing and programming road safety improvements for pedestrians crossing roadways at signalized and non-signalized intersections within the City of Ottawa.

Residents often have a good understanding for the day-to-day functioning and existing safety risks at a given intersection in their community which may, or may not, be reflected in traffic statistics. Therefore, this project involves both community engagement and traditional safety statistics, in the gathering of data and decision components of the process. This human-centred approach to pedestrian safety evaluation used in this Pedestrian Safety Evaluation Program is a first in Canada. City staff is not aware of any other municipality within Canada that uses a collaborative

approach with community engagement to undertake pedestrian safety reviews at intersections.

The Pedestrian Safety Evaluation Program will be launched as a three year pilot project, during which a total of approximately 23 intersections will be reviewed from a pedestrian safety perspective. At the end of the three year period, City staff will prepare a report for Transportation Committee on the three year pilot project and provide recommendations on sustaining this program into future years. The benefits of applying this rollout strategy include:

- Validating the process that has been developed;
- Fine tuning the various tools developed according to data collected and experience gained during the evaluation of the 23 intersections;
- Refining the process for community-input into the program;
- Confirming resource requirements to sustain the program in future years; and,
- Collaborating with the Infrastructure Services Branch (ISB) staff in order to incorporate this program in the planning and design phases of future roadway reconstruction projects.

The proposed process is based on well founded methodologies developed by the Federal Highway Administration (FHWA) and the Transportation Research Board (TRB).

The Pedestrian Safety Evaluation Program process contains the following phases:

- A prioritization or “network screening” phase which is intended to identify high collision and/or high risk locations;
- A diagnosis or investigation phase in which possible causal factors are identified, and candidate countermeasures are selected (the detailed engineering study – DES);
- A countermeasures evaluation and programming phase in which project specific recommendations are made, a prioritized program of work is finalized, and that program is implemented; and,
- A monitoring phase in which the outcome of the implemented countermeasures on safety risks is assessed, documented, monitored and evaluated.

All four phases of the Program rely heavily on local community involvement.

Analytical tools have been developed to assist staff and the community in the prioritization and countermeasure evaluation phases of the Pedestrian Safety Evaluation Program.

Applying this Pedestrian Safety Evaluation Program will help minimize the frequency and severity of preventable collisions involving pedestrians by providing guidance in the selection of cost-effective countermeasures, improving the speed at which a decision can be reached, and improving the accuracy of the decision that is reached.

An improvement in the accuracy of road safety investment decisions and priorities returns a great degree of benefits to overall road safety. The Pedestrian Safety Evaluation Program process is formal, accurate and efficient, and countermeasures can be selected that will be more economical and minimize the frequency and severity of preventable collisions involving pedestrians

#### Consultation:

The consultation activities that have occurred as part of the development of the proposed Pedestrian Safety Evaluation Program are described below.

City staff have consulted with the Pedestrian and Transit Advisory Committee during their scheduled meetings on three occasions: July 16, 2009, November 19, 2009, and February 18, 2010.

A Public Advisory Meeting took place at City Hall on September 2, 2009. Members of the Pedestrian and Transit Advisory Committee, the Roads and Cycling Advisory Committee, and the Accessibility Advisory Committee were invited to participate.

A Technical Advisory Committee was formed composed of members from various City Departments (Public Works, Ottawa Public Health, Infrastructure Services, Transit Services, Planning and Growth Management) as well as from the Ottawa Police and the National Capital Commission.

An interactive charette consultation/evaluation event was held on October 26, 2009, and included City staff, City of Ottawa advisory committee members and residents.

During the charette consultation event, two pilot intersections, Donald Street and Vanier Parkway, and Carling Avenue and Holland Avenue, were reviewed from a pedestrian safety perspective. The analytical tools and guidelines developed were used to identify pedestrian safety risks and issues. Candidate treatments to mitigate the identified risks were then discussed.

### Financial Implications:

There are no financial implications with the approval of the recommendations in this report.

Funds to complete two (2) pilot intersections, Donald Street and Vanier Parkway, and Carling Avenue and Holland Avenue are available in the Safety Improvement Program Capital Budget.

Staff does not anticipate that additional funding is required to implement the recommended countermeasures at the 21 intersections identified for review in 2011 and 2012 as they will occur during the planned reconstruction of the roadway.

Following the three year pilot project the evaluation report will provide recommendations on funding to operate a sustained program.

### BACKGROUND

In 1996, the former Regional Municipality of Ottawa-Carleton approved a Transportation Environment Action Plan (TEAP) application that initiated the “Walking Security Index (WSI) Project”, a joint research project between the former Region of Ottawa-Carleton and the University of Ottawa. In 2002, the Public Works Department undertook a study to assess how to operationalize the WSI, including evaluating how effective this “tool” could be. A technical review to determine the appropriateness of applying the WSI was conducted. The review concluded that the WSI could not be implemented as a tool to measure a pedestrian’s sense of security at intersections, as staff found, at that time, that it could not be readily “operationalized” or applied in a practical sense.

This information was provided to the Transportation and Transit Committee on February 5, 2003. At this Committee meeting, the following motion was approved, which was subsequently approved by City Council at its February 26, 2003 meeting:

*“That Council direct staff to continue to pursue the development of methods that can be used to assess pedestrian safety at intersections, using both the information developed by the Walking Security Index, other analytical techniques, and report to Committee and Council.”*

Staff has been pursuing the original objective of developing an analytical tool to quantify the comfort and security of pedestrians. The required approach to achieve the goals must take into consideration a process that is cost effective, and yields a sound, consistent, and technically defensible approach to the evaluation of pedestrian safety. This report outlines the development of a new and structured process to address human-centred pedestrian road safety issues at signalized and non-signalized intersections.

## DISCUSSION

Road users are limited in their attention and information processing, visual and perception-reaction skills, and hence make frequent mistakes. These errors often do not result in collisions because road users compensate for errors of others or because the circumstances are forgiving (e.g., there is room to manoeuvre and avoid a crash). Near misses, or conflicts, are much more frequent than collisions and this information does not register in “technical evaluations”. Accordingly, this type of history is often the type of critical knowledge local residents have in relation to a given intersection.

Based on an understanding of the road user tasks in an intersection, in combination with knowledge of road user limitations, it is possible to identify ways in which intersection design can lead to error, and to identify countermeasures likely to reduce these errors. These design flaws can often be identified with the help of residents who are familiar with the intersection in study, hence facilitating the process for selecting countermeasures most likely to reduce safety risks for pedestrians.

Improvements to pedestrian crossings, at signalized and non-signalized intersections, can be achieved by introducing intersection design elements that:

- Shorten pedestrian crossing distances;
- Increase pedestrian and vehicle visibility;
- Simplify the crossing task;
- Control vehicle speeds; and,
- Control vehicle and pedestrian path.

A general road safety improvement or safety evaluation program aims at identifying opportunities for investment in appropriate and cost-effective road safety engineering treatments. Such programs usually include:

- A prioritization or “network screening” phase which is intended to identify high collision and high risk locations;

- A diagnosis or investigation phase in which possible causal factors are identified, and candidate countermeasures are selected (the detailed engineering study – DES);
- A countermeasures evaluation and programming phase in which project specific recommendations are made, a prioritized program of work is finalized, and that program is implemented; and,
- A monitoring phase in which the outcome of the implemented countermeasures on safety risks is assessed, documented, monitored and evaluated.

All four phases of the Program rely heavily on local community involvement.

This framework of a safety evaluation program is illustrated in Document 1.

In developing a Pedestrian Safety Evaluation Program, the objectives were to enhance the processes used for selecting candidate intersections for detailed pedestrian safety analysis and for selecting appropriate and cost-effective countermeasures to be implemented. These objectives include:

- Improving the understanding of the relationship of pedestrian needs and safety issues in the context of signalized and non-signalized intersections;
- Developing an overall approach to prioritizing and programming road safety improvements for pedestrians crossing roadways;
- Providing a community-based tool for proactive input to the identification of intersections requiring detailed study;
- Setting up a defined and documented ongoing process to build and maintain a 5-year program, thereby increasing overall safety for pedestrians within the City;
- Creating a dedicated team of City staff with resources to carry out the necessary data collection, collation, analysis, and community consultation;
- Developing technical tools for prioritizing intersections and identifying countermeasures to improve pedestrian safety; and,
- Providing related technical and user guide documentation.

The Pedestrian Safety Evaluation Program is essentially a decision support system. Each of its fundamental components (network screening, diagnosis, countermeasures evaluation and programming, and monitoring) contributes to providing information to decision makers, and assists them in making decisions where funding for road safety engineering improvements related to pedestrians is best allocated. For the City of Ottawa, the approval and implementation of the Pedestrian Safety Evaluation Program will result in:

- Improving the speed with which a decision can be reached (efficiency); and,
- Improving the accuracy of the decision that is reached (risk management and quality).

An improvement in the accuracy of road safety investment decisions and priorities returns a great degree of benefits to overall road safety. With this Pedestrian Safety Evaluation Program's process that is formal, accurate and efficient, countermeasures can be selected that will be more economical and minimize the frequency and severity of preventable collisions involving pedestrians.

### City of Ottawa Collision and Enforcement Data

A total of 74,029 reportable collisions were reported in the City of Ottawa in the five years between January 1, 2004 and December 31, 2008. Of these, 1,825 involved pedestrians with 32 deaths and 1,654 injuries. Additional information about the statistics presented above is provided in Table 1 of Document 2.

During this time period, the total societal economic impact due to collisions involving pedestrians in Ottawa was estimated close to \$700 million in 2008 figures. For the year 2008 alone, the total societal economic impact due to collisions involving pedestrians was estimated close to \$200 million in 2008 figures. The cost estimation amounts are based on the "*Willingness to Pay*" figures provided by the 2007 MTO-Transport Canada document "*Analysis and Estimation of the Social Cost of Motor Vehicle Collisions in Ontario – 2004*". Additional information about the statistics discussed above is provided in Table 2 of Document 2.

In addition to the collision data, the Ottawa Police Service made available a list of all offence notices issued in relation to pedestrian activity from January 1, 2005 to December 31, 2008. For the four year period, a total of 325 offence notices were issued to drivers in relation to pedestrians. Significant Highway Traffic Act (HTA) and City By-law offences included failing to yield to pedestrians at intersections or mid-block locations (58%), and failing to yield to pedestrians or persons in wheelchairs at crossovers (36%).

For the same four year period, a total of 917 offence notices were issued to pedestrians. Significant Highway Traffic Act (HTA) and City By-law offences included failing to use the crosswalk (44%), disobeying the "Don't Walk" signal (30%), failing to keep on



the left side of the roadway or highway where there is no sidewalk (10%), and crossing or entering the roadway when prohibited (8%).

### Pedestrian Safety Research and Literature

The technical research and development elements of this study followed a logical series of steps including a detailed and carefully focused literature and research-in-progress review that has provided much of the technical groundwork. Document 3 provides more information on the research that has been undertaken in this area by the Federal Highway Administration (FHWA) and Transportation Research Board (TRB) in the United States. Given that there are many similarities between Canada and United States roads and infrastructures, review of research and literature in the United States was found to be the most appropriate in the City of Ottawa context. Furthermore, staff believe that the research and methodologies developed in recent years, as noted in Document 3, are well founded and technically defensible. Staff are of the opinion that the new tools and guidelines can be used to help reduce pedestrian safety risks at intersections in the City of Ottawa. Hence, the methodologies and tools developed by the FHWA, the National Cooperative Highway Research Program (NCHRP) and other sources have been retained and customized for use by the City to form Ottawa's Pedestrian Safety Evaluation Program.

A Technical Foundation report describing the review and research conducted as part of the development of the Pedestrian Safety Evaluation Program is provided in Document 4. The Technical Foundation report also includes a section discussing road user needs at intersections.

Findings of the review and research conducted are summarized below:

- There is a strong and well-documented relationship between pedestrian safety risks and site-specific characteristics such as the width of an intersection and the volume of pedestrians or vehicles;
- It was determined that the FHWA processes for prioritization and selecting candidate countermeasures are appropriate for use in the context of the City of Ottawa. The prioritization tool with the pedestrian intersection safety index (Ped ISI) was developed using statistical analysis of data gathered from relevant pedestrian crosswalk sites. In addition, both the Ped ISI and the countermeasure selection (PEDSAFE) tools use readily available site-specific data, and do not require onerous amounts of effort or resources to carry out the analyses. In addition, the simplicity of the tools adds to their user-friendliness and the ability

to develop customized versions in a spreadsheet environment specific to the City of Ottawa;

- The use of pedestrian collision history is not well suited to the prioritization process as the frequency of pedestrian-related collisions is too sparse; and,
- Although there are issues with the use of pedestrian collision history, it is still a valuable piece of evidence during the diagnostic stage of a Pedestrian Safety Evaluation Program, as the patterns and trends gleaned from the data help identify the key safety risks at a given site.

### Analytical Tools

Based on the literature review and research conducted, two distinct phases of the proposed Pedestrian Safety Evaluation Program proved to be easily improved with the help of analytical tools. As such, the prioritization tool (Ottawa Ped ISI) and the countermeasure selection tool (Ottawa PEDSAFE) were developed.

The User Guide for Technical Tools report, available as Document 5, provides information concerning the technical foundation for the tools and guidance on their use.

The concept for each tool and the technical background behind them are briefly described below.

#### The Prioritization Tool (Ped ISI):

The FHWA has developed a robust and technically defensible analytical process for prioritizing pedestrian crosswalks and is suitable for application in the City of Ottawa context. Therefore, the analytical elements of this tool were taken and a customized, spreadsheet-based version for use by City staff was developed and called the Ottawa Pedestrian Intersection Safety Index (Ped ISI).

The Ottawa Ped ISI process calculates a pedestrian safety index (PSI) value for each crosswalk at an intersection and then an overall pedestrian intersection safety index (Ped ISI) based on the average of all crosswalks. A safety index value of 1.0 represents a relatively low-risk crosswalk or intersection and an index value of 6.0 represents a high-risk crosswalk or intersection.

One of the greatest benefits of the Ped ISI process is that it requires a limited amount of data that is readily available. The data that is used in this process includes type of traffic control, number of through lanes (an indicator of roadway width), vehicle

operating speed, the volume of traffic (an indication of exposure) and the type of land use (as an indicator of pedestrian activity). If some of the required data is not available, one individual can easily collect it during a short field visit.

#### The Countermeasure Selection Tool (Ottawa PEDSAFE):

Once the prioritization of intersections for further detailed engineering study is completed, City staff and residents can complete a field review of the intersections. A Pedestrian Safety Field Guide and Workbook has been prepared to assist City staff and residents during the field review component. This guide and workbook is shown in Document 6.

Once City staff has carried out a detailed engineering study, reviewed information submitted by residents, and diagnosed the issues, there is a need to identify candidate pedestrian safety countermeasures. The FHWA countermeasure selection tool PEDSAFE was found to be technically robust, used readily available data and was user friendly. Therefore, some elements of this expert system have been applied, additional safety countermeasures have been added and a customized, spreadsheet-based version for use by City staff has been developed. This adapted countermeasure tool has been called Ottawa PEDSAFE.

Users of the countermeasure selection tool will need to gather data in two areas; site characteristic information (i.e. high or low traffic volumes), and the key site-specific safety risks that need to be addressed (i.e. the need to reduce vehicle speeds). The majority of the input data for the tool will likely have been gathered as part of the detailed engineering study and the residents' pedestrian and driver needs assessment.

Once users enter the data, the tool will search the countermeasure database of over 60 countermeasures and generate two lists of candidate treatments; one list with countermeasures appropriate for the site characteristics (list #1) and another list with countermeasures appropriate for the safety risks (list #2). The tool then will generate a third and final list of candidate countermeasures from the common treatments that address both site characteristics and safety risks.

A Pedestrian Intersection Safety Countermeasure Handbook is shown in Document 7. This document has been prepared as an aid to select the most appropriate safety treatments once a problem diagnosis has been made. This tool is intended to supplement the countermeasure selection tool and provide background and contextual information for all candidate countermeasures that the software may not provide.

#### Developing a Collaborative Process

The proposed process to address pedestrian safety issues at signalized and non-signalized intersections requires the involvements of residents in the gathering of data and decision components of the process. Based on these requirements, and following the framework of a safety evaluation program as previously discussed, a proposed programming process suited to the City of Ottawa context was developed and named Ottawa's "Pedestrian Safety Evaluation Program" (PSEP).

Residents often have a good understanding and feel for the operations and existing safety risks at a given intersection in their community. City staff conducting a detailed engineering safety review of an intersection may overlook this "human-centred" component of pedestrian safety risk. For this reason, Ottawa's Pedestrian Safety Evaluation Program has been designed as two separate work streams to be carried out by City staff and residents, respectively. The work streams are generally carried out independently and concurrently, with pre-defined interfaces to maintain communications between the two parties and to ensure the needs of each are being satisfied.

The complete process for the proposed Pedestrian Safety Evaluation Program is demonstrated graphically in Document 8.

During the course of the entire programming process, there are consultation meetings between City staff and residents to discuss findings and results. This provides collaborative opportunities to explain and discuss the decisions made (to that particular point in the process) as well as gather input for the next steps.

It may be challenging, in some communities, to engage groups of individuals to assist City staff in assessing safety issues and risks at the selected intersections. The City will be undertaking the following activities to help engage groups of individuals in this program, such as:

- Organizing campaigns and distributing flyers in order to promote the program;
- Conducting surveys in target locations such as near parks, residences for the elderly, hospitals and health care centres, etc, to gather data on public opinion related to pedestrian safety issues at intersections; and,
- Developing a collaborative website to serve as a direct link between residents and City staff.

The human-centred approach to pedestrian safety evaluation used in this Pedestrian Safety Evaluation Program is a first in Canada. City staff is not aware of any other

municipality within Canada that uses a collaborative approach with community engagement to undertake pedestrian safety reviews at intersections.

### Charette Consultation Event – Evaluation of the Process and Tools

A “charette” consultation event was held on October 26, 2009 with City staff, Roads and Cycling, and Pedestrian and Transit Advisory Committee members and residents to allow prospective users of the Pedestrian Safety Evaluation Program to experience the process, and provide feedback on the procedures, tools and guidelines.

Two intersections were selected for review (Donald Street and Vanier Parkway, and Carling Avenue and Holland Avenue). Existing pedestrian safety issues and risks were identified and evaluated at these intersections. Then, using the tools and guidelines, candidate countermeasures to reduce the pedestrian safety risks were discussed.

The candidate countermeasures identified and discussed through the review of the two pilot intersections included the following:

- Installing countdown pedestrian signals;
- Implementing a leading pedestrian interval (which give pedestrians a slight lead time making them more visible to traffic);
- Providing better access to the push buttons;
- Enhancing crosswalk markings;
- Improving the curb height and ramps with steep grades;
- Providing adequate sidewalk continuity and refuge areas between and at transit stops;
- Improving grades in crosswalk to reduce pooling of ice and water;
- Modifying or removing refuge islands (right-turn channel);
- Installing supplementary signage to identify the presence of pedestrians;
- Formalizing two-stage crossing; and,
- Improving visibility (shrubs/trees to trim or remove).

This meeting helped test the tools developed and helped highlight and identify aspects of the proposed process that may have been overlooked and/or needed improvement.

### Recommended Implementation Plan for the Pedestrian Safety Evaluation Program

Public Works staff is recommending that the Pedestrian Safety Evaluation Program be launched as a three year pilot project. It is proposed that the two intersections evaluated

at the charette be completed in 2010. Funds to complete this work are available in the 2007 and 2009 Safety Improvement Program Budgets.

It is also proposed that a further 21 intersections be identified for review in 2011 and 2012, which would represent one intersection per ward. These intersections would be selected throughout the City, in consultation with City Councillors. Staff will identify locations that are on the prioritization list and where planned reconstruction of the roadway through a capital works project is planned. Staff does not foresee additional funding required to implement the recommended countermeasures at these intersections as they will occur during the planned reconstruction of the roadway.

At the end of the three year period, City staff will prepare a report for Transportation Committee on the three year pilot project and will provide recommendations on sustaining this program into future years. The benefits of applying this rollout strategy include:

- Validating the process that has been developed;
- Fine tuning the Field Guide and Workbook and the Countermeasure Handbook based on experience gained during the evaluation of the 23 intersections;
- Refining the process for community-input in the program;
- Confirming resource requirements to sustain the program in future years; and,
- Collaborating with the Infrastructure Services Branch (ISB) staff in order to incorporate this program in the planning and design phases of future roadway reconstruction projects.

## RURAL IMPLICATIONS

The Pedestrian Safety Evaluation Program has a focus on addressing pedestrian safety issues and risks at signalized and non-signalized intersections that have a high pedestrian volume and are typically located in an urban/suburban setting.

For those intersections that are located in a rural setting, where pedestrian activity is normally centered within villages and hamlets and can have lower pedestrian volumes and different characteristics than in an urban setting, staff will be relying on the experiences of residents in these communities to address the concerns of the intersections being evaluated.

## CONSULTATION

The consultation activities that have occurred as part of the development of the proposed Pedestrian Safety Evaluation Program are described below.

City staff have consulted with the Pedestrian and Transit Advisory Committee during their scheduled meetings on three occasions: July 16, 2009, November 19, 2009, and February 18, 2010.

A Public Advisory Meeting took place at City Hall on September 2, 2009. Members of the Pedestrian and Transit Advisory Committee, the Roads and Cycling Advisory Committee, and the Accessibility Advisory Committee were invited to participate.

A Technical Advisory Committee was formed composed of members from various City Departments (Public Works, Ottawa Public Health, Infrastructure Services, Transit Services, Planning and Growth Management) as well as from the Ottawa Police and the National Capital Commission.

An interactive charette consultation/evaluation event was held on October 26, 2009, and included City staff, City of Ottawa advisory committee members and residents.

#### COMMENTS BY THE WARD COUNCILLORS

City staff have met with the Chair of Transportation Committee, Councillor McRae, who is supportive of the program. All Councillors will be consulted following the approval of the pilot.

#### LEGAL/RISK MANAGEMENT IMPLICATIONS

There are no legal/risk management impediments to implementing the report recommendations.

#### CITY STRATEGIC PLAN

The principles of the Ottawa Pedestrian Plan (approved by City Council in June 2009) are reflected in the safety strategies recommended in the proposed Pedestrian Safety Evaluation Program.

The principles of the Transportation Master Plan are reflected in the proposed Pedestrian Safety Evaluation Program by serving as an initiative to promote safe travel behaviours by pedestrians and other road users, including focus on vulnerable pedestrians such as children and seniors.

The collaborative approach of the Pedestrian Safety Evaluation Program is in line with the City's Service Excellence mandate of community engagement.

### TECHNICAL IMPLICATIONS

There are no technical implications associated with the implementation of the report recommendations.

### FINANCIAL IMPLICATIONS

There are no financial implications with the approval of the recommendations in this report.

Funds to complete two (2) pilot intersections, Donald Street and Vanier Parkway, and Carling Avenue and Holland Avenue are available in the Safety Improvement Program Capital Budget.

Staff does not anticipate that additional funding is required to implement the recommended countermeasures at the 21 intersections identified for review in 2011 and 2012 as they will occur during the planned reconstruction of the roadway.

Following the three year pilot project the evaluation report will provide recommendations on funding to operate a sustained program.

### SUPPORTING DOCUMENTATION

Document 1 – General Form of a Safety Evaluation Program

Document 2 – Reportable Collisions Involving Pedestrians (2004 to 2008)

Document 3 – Recent Pedestrian Safety Research and Literature

Document 4 – Technical Foundation Report (Distributed separately and held on file with the City Clerk)



Document 5 – User Guide for Technical Tools (Distributed separately and held on file with the City Clerk)

Document 6 – Pedestrian Safety Field Guide and Workbook (Distributed separately and held on file with the City Clerk)

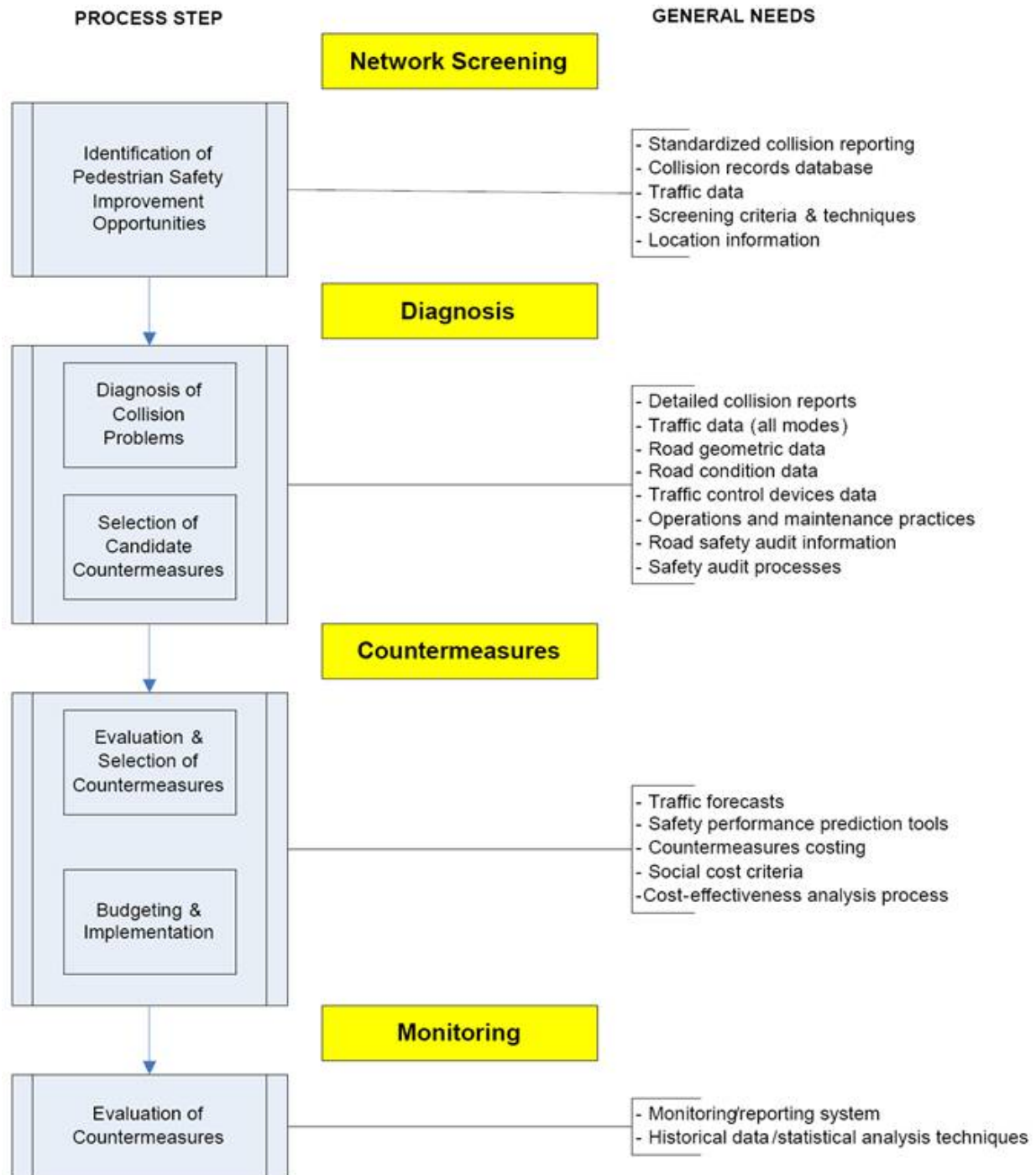
Document 7 – Pedestrian Intersection Safety Countermeasure Handbook (Distributed separately and held on file with the City Clerk)

Document 8 – Illustration of the Proposed Process - Pedestrian Safety Evaluation Program

#### DISPOSITION

Following Council approval, Public Works staff will implement the recommendations identified in this report.

## **DOCUMENT 1 GENERAL FORM OF A PEDESTRIAN SAFETY EVALUATION PROGRAM**



**DOCUMENT 2**

**REPORTABLE COLLISIONS INVOLVING PEDESTRIANS (2004 TO 2008)**

**Table 1: Reportable Collisions Involving Pedestrians, January 1<sup>st</sup> 2004 to December 31<sup>st</sup> 2008**

Year	Reportable collisions	Reportable collisions involving pedestrians			Pedestrian deaths in reportable collisions		Pedestrian injuries in reportable collisions	
	Total	Total	Percent of total	Increase from previous year	Total	Increase from previous year	Total	Increase from previous year
	#	#	%	%	#	%	#	%
2008	15,638	372	2.4%	2.5%	10	67%	333	2%
2007	15,309	363	2.4%	-2.9%	6	20%	327	-2%
2006	14,370	374	2.6%	1.4%	5	0%	334	-1%
2005	14,570	369	2.5%	6.3%	5	-17%	339	6%
2004	14,142	347	2.5%	n/a	6	n/a	321	n/a
<b>Total</b>	<b>74,029</b>	<b>1,825</b>	<b>2.5%</b>		<b>32</b>		<b>1,654</b>	

**Table 2: Societal Economic Impact of Reportable Collisions Involving Pedestrians, January 1<sup>st</sup> 2004 to December 31<sup>st</sup> 2008**

Year	Reportable collisions involving pedestrians	Pedestrian deaths	Pedestrian injuries	Estimated societal cost (2008 \$)*
	#	#	#	\$ 000,000
2008	372	10	333	201
2007	363	6	327	132
2006	374	5	334	116
2005	369	5	339	116
2004	347	6	321	132
<b>Total</b>	<b>1825</b>	<b>32</b>	<b>1654</b>	<b>697</b>

\*Cost estimation amounts based on the “Willingness to Pay” figures provided by the 2007 MTO-Transport Canada document “Analysis and Estimation of the Social Cost of Motor Vehicle Collisions in Ontario – 2004”. The 2004 values provided in the document have been inflated with a CPI of 2.4%.

## DOCUMENT 3

### RECENT PEDESTRIAN SAFETY RESEARCH AND LITERATURE

#### Recent Pedestrian Safety Research and Literature

The field of “traffic engineering science” has progressed significantly since the City’s original efforts on pedestrian safety began. In particular, the Federal Highway

Administration (FHWA) and the Transportation Research Board (TRB) have a large body of research that has been carried out in recent years related to pedestrian safety at intersections.

#### Federal Highway Administration (FHWA)

The FHWA began studying pedestrian safety countermeasures in 2002 and produced an initial document called the *Pedestrian Facility User Guide: Providing Safety and Mobility*. This work was updated in 2004 and out of these efforts came an expert system entitled PEDSAFE. This tool facilitates the countermeasure selection process by requiring the user to identify the key safety risks (from a list of eight risk types) and predominant collision types that are occurring at a given site (from a list of 12 collision types). The countermeasures identified in the PEDSAFE tool are based on past research efforts and these treatments have been shown to improve pedestrian safety at crosswalks.

Following the efforts in producing the PEDSAFE tool, the FHWA determined that there was a need to develop a technical process to proactively identify and rank sites for safety upgrades. The subsequent study compiled data from multiple sites and a statistical regression analysis was carried out to determine which site-specific characteristics demonstrated the strongest relationship. From this study an equation calculating a pedestrian intersection safety index (Ped ISI) was developed.

#### National Cooperative Highway Research Program (NCHRP)

Under the TRB, the NCHRP was created as a means to conduct research in areas that affect highway planning, design, construction, operation and maintenance. The NCHRP Report 500 provides guidance when implementing the AASHTO Strategic Highway Safety Plan. The focus of the Report 500 series is to identify potential safety countermeasure strategies, classify them, provide an indication on implementing timeframes, and the relative cost of implementing the strategy. Volume 10 of this series provides guidance on reducing collisions involving pedestrians.

## **DOCUMENT 8 ILLUSTRATION OF THE PROPOSED PROCESS PEDESTRIAN SAFETY EVALUATION PROGRAM**

